IN THE CLAIMS

Kindly amend the claims as follow:

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1. (Currently amended) A method for determining relationships among objects represented in a database, the method comprising the steps of:

defining at least one interior rectangle that lies entirely within ~~the~~ a first geometry;

defining a minimum bounding rectangle for the first geometry corresponding to a first object in the database;

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defining a minimum bounding rectangle for a second geometry corresponding to a second object in the database;

comparing the minimum bounding rectangle for the first geometry with the minimum bounding rectangle for the second geometry to determine if the second geometry fulfills a primary filter condition comprising an interaction of the first geometry and the second geometry;

if the second geometry fulfills the primary filter condition, determining whether the second geometry fulfills an intermediate filter condition comprising an interaction of the first geometry and the second geometry by analyzing the distribution of the second geometry with respect to the at least one interior rectangle within the first geometry; and

determining whether the second geometry fulfills ~~the~~ a secondary filter condition by comparing the second geometry with the first geometry if the second geometry fulfills the primary filter condition but is not confirmed as fulfilling the ~~secondary~~ intermediate filter condition based upon the distribution of the second geometry with respect to the at least one

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interior rectangle;

wherein the steps are performed by a computer.

2. (Original) The method according to claim 1, wherein the first geometry comprises a query geometry and the second geometry comprises a data geometry stored in a database.

3. (Original) The method according to claim 1, wherein the first geometry comprises a data geometry stored in a database and the second geometry comprises a query geometry.

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4. (Original) The method according to claim 1, wherein the first geometry is larger than the second geometry.

5. (Original) The method according to claim 1, wherein minimum bounding rectangles are defined for a plurality of second geometries.

6. (Original) The method according to claim 1, wherein the first geometry is a collection of geometries each including a separate interior.

7. (Original) The method according to claim 1, wherein the primary filter condition comprises any intersection between the minimum bounding rectangle for the first geometry and the minimum bounding rectangle for the second geometry.

8. (Currently amended) The method according to claim 1, wherein dividing the first geometry into a plurality of interior rectangle comprises:

~~defining a minimum bounding rectangle for the first geometry~~;

dividing the minimum bounding rectangle for the first geometry into a plurality of pieces; and

defining a largest possible interior rectangle lying completely within the first geometry and each piece.

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9. (Original) The method according to claim 8, wherein the pieces are rectangles.

10. (Currently amended) The method according to claim 9, wherein the minimum bounding rectangle <u>for the first geometry</u> is divided into five rectangles having similar shapes and sizes.

11. (Currently amended) The method according to claim 9, wherein the minimum bounding rectangle <u>for the first geometry</u> is divided into four rectangles having similar shapes and sizes.

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12. (Original) The method according to claim 1, wherein the minimum bounding rectangle comprises a smallest rectangle that at most intersects a boundary of the second geometry.

13. (Original) The method according to claim 1, wherein the intermediate filter condition is fulfilled if the second geometry lies entirely within the minimum bounding rectangle of the first geometry.

14. (Original) The method according to claim 1, wherein the primary filter condition includes at least one member selected from the group comprising:

the minimum bounding rectangle lies entirely within the minimum bounding rectangle of the first geometry;

the minimum bounding rectangle intersects the minimum bounding rectangle of the first geometry;

a border of the minimum bounding rectangle touches a border of the minimum bounding rectangle of the first geometry;

the minimum bounding rectangle of the first geometry lies entirely within the

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minimum bounding rectangle; and

the minimum bounding rectangle is disjoint from the minimum bounding rectangle of the query geometry.

15. (Original) The method according to claim 1, wherein the first geometry is divided into five interior rectangles.

16. (Original) The method according to claim 1, wherein one of the first object and the second object comprises an object in a database.

17. (Original) The method according to claim 16, wherein the database comprises locations in a geographic region.

18. (Original) The method according to claim 16, wherein the database is organized in an R-tree hierarchy or variant of an R-tree.

19. (Original) The method according to claim 16, wherein the database comprises a spatial database.

20. (Original) The method according to claim 16, wherein the first geometry and the second geometry comprise objects on surface.

21. (Original) The method according to claim 20, wherein the database stores exact geometries and approximations of geometries.

22. (Original) The method according to claim 1, wherein determining whether the first geometry and the second geometry fulfill the secondary filter condition comprises mathematically comparing the fist geometry and the second geometry.

23. (Original) The method according to claim 1, wherein the secondary filter condition is fulfilled if the first geometry and the second geometry overlap.

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24. (Original) The method according to claim 1, wherein the secondary filter condition is fulfilled if a boundary of the first geometry touches a boundary of the second geometry.

25. (Original) The method according to claim 1, wherein the secondary filter condition is fulfilled if the first geometry and the second geometry intersect.

26. (Original) The method according to claim 1, wherein at least one of the first geometry and the second geometry is convex.

27. (Original) The method according to claim 26, wherein at least one of the first geometry and the second geometry comprises a plurality of separate interiors.

28. (Original) The method according to claim 1, wherein at least one of the first geometry and the second geometry is concave.

29. (Currently amended) A method for determining relationships among objects represented in a database, the method comprising the steps of:

defining at least one interior rectangle that lies entirely within a first geometry;

defining an approximation of the first geometry corresponding to a first object in the database;

defining an approximation of a second geometry corresponding to a sec object in the database;

comparing the approximation of the first geometry with the approximation of the second geometry to determine if the second geometry fulfills a primary filter condition comprising an interaction of the first geometry and the second geometry;

if the second geometry fulfills the primary filter condition, determining whether the

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second geometry fulfills an intermediate filter condition comprising an interaction of the first geometry and the second geometry by analyzing the distribution of the second geometry with respect to the at least one interior rectangle within the first geometry; and

determining whether the second geometry fulfills the secondary filter condition by comparing the second geometry with the first geometry if the second geometry fulfills the primary filter condition but is not confirmed as fulfilling the ~~secondary~~ intermediate filter condition based upon the distribution of the second geometry with respect to the at least one interior rectangle;

wherein the steps of are performed by a computer.

30. (Original) The method according to claim 29, wherein at least one of the first geometry and the second geometry is convex.

31. (Original) The method according to claim 30, wherein at least one of the first geometry and the second geometry comprises a plurality of separate interiors.

32. (Original) The method according to claim 29, wherein at least one of the first geometry and the second geometry is concave.

33. (Original) The method according to claim 32, wherein concave geometries are approximated utilizing convex pieces.

34. (Original) The method according to claim 32, wherein concave geometries are approximated utilizing tiles.

35. (Original) The method according to claim 34, wherein a minimum bounding rectangle is tiled and tiles interior to the geometry are identified.

36. (Original) The method according to claim 34, wherein the tiling level is 5.

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37. (Original) The method according to claim 34, wherein the tiling level is 4.

38. (Original) The method according to claim 34, wherein the tiling level is 3.

39. (Original) The method according to claim 34, wherein determining whether the primary filter condition is fulfilled comprises comparing interior tiles.

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40. (Original) The method according to claim 32, wherein the approximation of the first geometry comprises a minimum bounding rectangle and the approximation of the second geometry comprises a minimum bounding rectangle and wherein comparing the interior tiles comprises:

dividing the second geometry minimum bounding rectangle into tiles;

assigning X and Y values to the tiles;

determining which tiles lie interior to the second geometry;

determining X and Y location of each tile;

storing the interior tiles in an array ordered first by X location;

storing the interior tiles in an array ordered first by Y location; and

comparing at least one of the tiles or the minimum bounding rectangle of the first geometry with the interior tiles of the second geometry to determine the relationships among the geometries.

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41. (Original) The method according to claim 40, wherein comparing the minimum bounding rectangle of the first geometry with the interior tiles of the second geometry comprises determining whether each side of the minimum bounding rectangle of first geometry is inside the interior tiles of the second geometry which comprises:

determining X and Y locations within the tiles of corners of the minimum bounding rectangle of the first geometry;

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determining X and Y locations within the tiles of second geometry for two corners of each side of the first geometry; and

determining whether all tiles between the two corners of each side of the first geometry are interior to the second geometry by comparing a difference in an x-location or a y-locations of the two corners to the number of interior tiles between these two corners.

42. (Original) The method according to claim 41, wherein whether the x-location or the y-location is compared depends upon whether the side is parallel to y-axis or x-axis.

43. (Original) The method according to claim 41, wherein the second geometry is not a simple polygon.

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44. (Original) The method according to claim 40, wherein comparing the minimum bounding rectangle of the first geometry with the interior tiles of the second geometry comprises determining whether each side of the minimum bounding rectangle of first geometry is inside the interior tiles of the second geometry which comprises:

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determining X and Y locations within the tiles of corners of the minimum bounding rectangle of the first geometry;

determining X and Y locations within the tiles of second geometry for two corners of line interior to the MBR of the first geometry; and

determining whether all tiles between the two corners any line interior to the MBR of the first geometry are interior to the second geometry by comparing a difference in an x-location or a y-locations of the two corners to the number of interior tiles between these two corners.

45. (Original) The method according to claim 41, wherein the second geometry is a compound geometry comprising multiple polygons or a geometry comprising holes, and wherein determining if the minimum bounding rectangle of the first geometry is interior to the interior tiles of second geometry by comparing the interior of the minimum bounding rectangle of first geometry to the interior tiles of second geometry.

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46. (Currently amended) A computer program product for performing a process of determining relationships among objects represented in a database, comprising:

a computer readable medium; and

computer program instructions, recorded on the computer readable medium, executable by a processor, for performing the steps of:

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defining at least one interior rectangle that lies entirely within the first geometry;

defining a minimum bounding rectangle for the first geometry <u>corresponding to a first object in the database</u>;

defining a minimum bounding rectangle for a second geometry <u>corresponding to a second object in the database</u>;

comparing <u>the</u> minimum bounding rectangle for the first geometry with the minimum bounding rectangle for the second geometry to determine if the second geometry fulfills a primary filter condition comprising an interaction of the first geometry and the second geometry;

if the second geometry fulfills the primary filter condition, determining whether the second geometry fulfills an intermediate filter condition comprising an interaction of the first geometry and the second geometry by analyzing the distribution of the second geometry with respect to the at least one interior rectangle within the first geometry; and

determining whether the second geometry fulfills the secondary filter condition by comparing the second geometry with the first geometry if the second geometry fulfills the primary filter condition but is not confirmed as fulfilling the ~~secondary~~ <u>intermediate</u> filter

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condition based upon the distribution of the second geometry with respect to the at least one interior rectangle.

47. (Currently amended) A system for performing a process of determining relationships among objects represented in a database, comprising:

a processor operable to execute computer program instructions; and

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a memory operable to store computer program instructions executable by the processor, for performing the steps of:

defining at least one interior rectangle that lies entirely within ~~the~~ a first geometry;

defining a minimum bounding rectangle for the first geometry corresponding to a first object in the database;

defining a minimum bounding rectangle for a second geometry corresponding to a second object in the database;

comparing the minimum bounding rectangle for the first geometry with the minimum bounding rectangle for the second geometry to determine if the second geometry fulfills a primary filter condition comprising an interaction of the first geometry and the second geometry;

if the second geometry fulfills the primary filter condition, determining whether the second geometry fulfills an intermediate filter condition comprising an interaction of the first geometry and the second geometry by analyzing the distribution of the second geometry with respect to the at least one interior rectangle within the first geometry; and

determining whether the second geometry fulfills the secondary filter condition by comparing the second geometry with the first geometry if the second geometry fulfills the

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primary filter condition but is not confirmed as fulfilling the ~~secondary~~ intermediate condition based upon the distribution of the second geometry with respect to the at least one interior rectangle.

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